



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/707,805	01/13/2004	Yi-Nan Chen	NTCP0027USA	1804

27765 7590 03/25/2005

NORTH AMERICA INTERNATIONAL PATENT OFFICE (NAIPC)

P.O. BOX 506

MERRIFIELD, VA 22116

EXAMINER


GEBREMARIAM, SAMUEL A

ART UNIT	PAPER NUMBER
----------	--------------

2811

DATE MAILED: 03/25/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.		Applicant(s) 	
	10/707,805		CHEN ET AL.	
	Examiner		Art Unit	
	Samuel A. Gebremariam		2811	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 06 January 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-19 is/are pending in the application.
- 4a) Of the above claim(s) 9-18 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-8 and 19 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 102

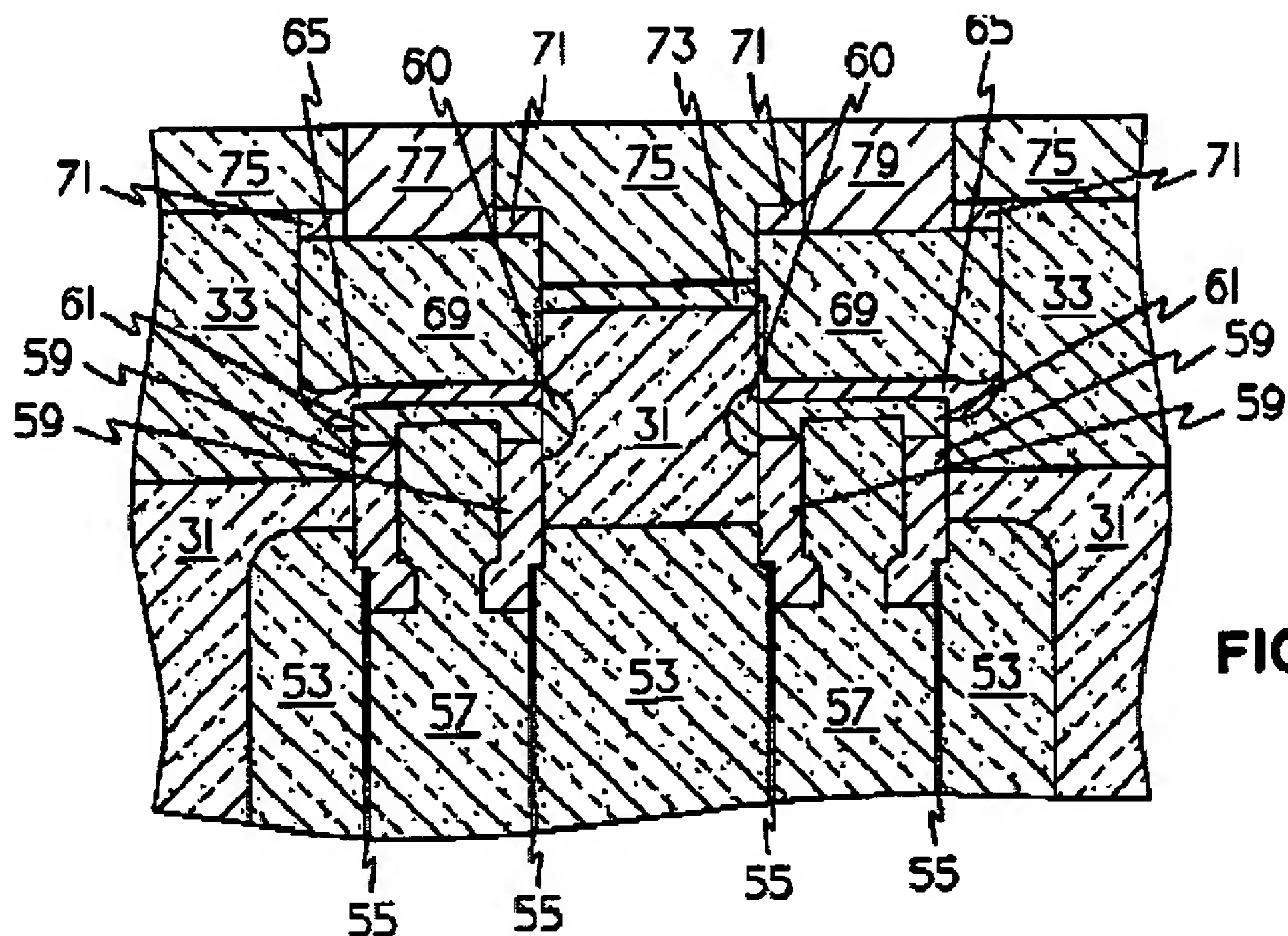
1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-2, 7-8 and 19 are rejected under 35 U.S.C. 102(b) as being anticipated by Furukawa et al., US patent No. 6,333,533.

Regarding claim 1, Furukawa teaches (figs. 1-10) an isolation structure of a trench capacitor (region 75 right above 31 in the middle), the trench capacitor being disposed in a deep trench (39) of a substrate (31) and comprising a conductive layer (57, 69) in the deep trench and a collar oxide layer (59) disposed on a surface of a sidewall of the deep trench, the isolation structure comprising: a first isolation portion (portion of 75 on the top left and right, above region 71) covering the conductive layer and filling a top opening of the deep trench (fig. 10), the first isolation portion having a first thickness; and a second isolation portion (portion of 75 that is thicker) directly contacting the first isolation portion and surrounding the deep trench without overlapping the deep trench (fig. 10), the second isolation portion having a second thickness larger than the first thickness (the 2nd isolation portion goes deeper than the 1st isolation portion).



Regarding claim 2, Furukawa teaches the entire claimed structure of claim 1 above including the second isolation portion is disposed by a side of the collar oxide layer (59), near the conductive layer (57, 69) and the collar oxide layer (59) without being located on the conductive layer (57, 69).

Regarding claims 7 and 8, Furukawa teaches the entire claimed structure of claim 1 above including the first isolation portion and the second isolation portion are oxide layers (col. 6, lines 1-10).

The limitation of "the first isolation portion and the second isolation portion are oxide layers formed by a high density plasma chemical vapor deposition (HDPCVD) process" is considered a product-by-process claim. "[E]ven though product-by process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process." *In re Thorpe*, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985).

Regarding claim 19, Furukawa teaches the entire claimed structure of claim 1 above including the first isolation portion is directly positioned on and contacts the trench capacitor. The first isolation portion is positioned over the oxide layer (71) that is directly positioned and contacting the trench capacitor via conductor region (69).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 4-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Furukawa in view of Alsmeier US patent No. 5,867,420.

Regarding claim 4, Furukawa teaches substantially the entire claimed structure of claim 1 above except explicitly stating the isolation structure further comprising an

Art Unit: 2811

isolation liner disposed between the first isolation portion and the conductive layer, the second isolation portion and the conductive layer, and the second isolation portion and the collar oxide layer.

Alsmeier teaches the use of liner structure (fig. 2d, liner 255, and col. 4, lines 45-62) in the formation of an isolation structure in a trench capacitor.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the liner structure taught by Alsmeier in the device of Furukawa in order to prevent oxygen diffusion.

The combined structure of Furukawa and Alsmeier would inherently teach the isolation structure having an isolation liner disposed between the first isolation portion and the conductive layer, the second isolation portion and the conductive layer, and the second isolation portion and the collar oxide layer.

Regarding claim 5, Furukawa teaches substantially the entire claimed structure of claim 1 above including the isolation liner comprises a nitride liner (col. 4, lines 45-62).

Regarding claim 6, Furukawa teaches substantially the entire claimed structure of claim 1 above including the isolation liner comprises an oxide liner (col. 4, lines 45-62).

5. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Furukawa in view of admitted prior art.

Furukawa teaches substantially the entire claimed structure of claim 1 above except explicitly stating that the bottom of the second isolation portion is lower than a top of the collar oxide layer.

Admitted prior art teaches (fig. 1) where the bottom of the second isolation portion (30) that is lower than the top of the collar oxide layer (22).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to adjust the height of the collar oxide layer and the bottom of the second isolation as claimed in the structure of Furukawa as taught by admitted prior art in order to provide better isolation.

Response to Arguments

6. Applicant's arguments filed on 1/6/2005 have been fully considered but they are not persuasive. Applicant argues that the first isolation portion does not directly contact the trench capacitor. However this limitation is not in independent claim 1.

Applicant further argues that the first isolation portion mentioned by examiner of the isolation structure (75) disclosed by Furukawa is only positioned at the sides of the conductor 77 (or 79) but does not fill the top opening of the deep trench 39. Referring to fig. 10 of Furukawa and looking at the isolation region (75) right above region (31), the isolation layer (75) comprises of two portions. The first portion is the one that partially covers conductive layer (69) and also fills the top opening of the deep trench (39) with a first thickness and the second portion is the portion that directly contacts the first isolation portion and having a thickness larger (deeper) than the first thickness.

Applicant also argues that Furukawa does not teach the second isolation portion of layer (75) is disposed only near the conductive layer 69 serving as a gate, but not disposed by a side of the conductive layer 57 serving as a storage node. However the claim only states that the second isolation portion is disposed by a side of the collar oxide layer (59), near the conductive layer (57, 69) and the collar oxide layer (59) without being located on the conductive layer (57, 69). Which is clearly shown in fig 10.

Conclusion

7. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

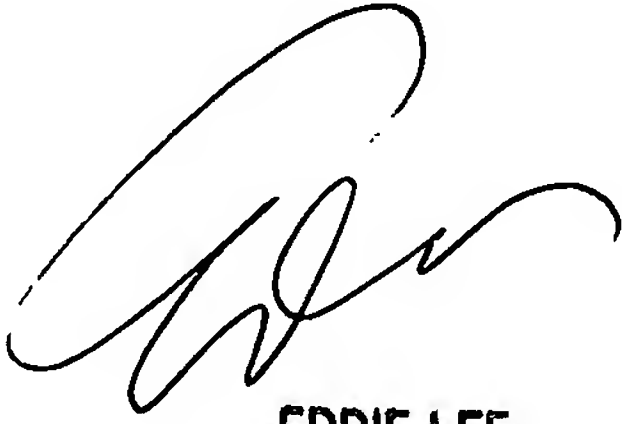
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Samuel A. Gebremariam whose telephone number is (571) 272-1653. The examiner can normally be reached on 8:00am-4:30pm.

Art Unit: 2811

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie Lee can be reached on (571) 272-1732. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

SAG
March 11, 2005



EDDIE LEE
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800